STABLE INOCULANT COMPOSITIONS AND METHODS FOR PRODUCING SAME

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a divisional of U.S. application Ser. No. 16/066,377 filed Jun. 27, 2018, now allowed, which is a 35 U.S.C. 371 national application of international application no. PCT/US2016/067745 filed Dec. 20, 2016, which claims priority or the benefit under 35 U.S.C. 119 of U.S. application Nos. 62/271,873 and 62/296,784 filed Dec. 28, 2015 and Feb. 18, 2016, respectively, the contents of which are fully incorporated herein by reference in its entirety.

NAMES OF PARTIES TO A JOINT RESEARCH AGREEMENT

[0002] The inventive concepts described herein were developed as part a joint research agreement between Monsanto Company and Novozymes BioAg A/S. The activities giving rise to the claimed invention were undertaken within the scope of the joint research agreement, said agreement having been in effect on or before the date the claimed invention was made.

FIELD OF THE INVENTION

[0003] The present disclosure relates to compositions and methods for enhancing the stability and survival of microbial spores in inoculant compositions.

BACKGROUND OF THE INVENTION

[0004] Inoculant compositions comprising agriculturally beneficial microorganisms are well known in the art. See, e.g., U.S. Pat. Nos. 5,484,464; 5,586,411; 5,695,541; 5,804,208; 5,916,029; 6,569,425; 6,808,917; 6,824,772; 7,429,477; 8,148,138; 8,278,247; 8,445,256; 8,883,679; 8,921,089; 8,999,698; 9,017,442; 9,101,088; 9,234,251; 9,340,464.

[0005] Because the effectiveness of such inoculant compositions generally depends on the ability of the microorganisms therein to survive and propagate following application, much effort has been made to increase the stability of agriculturally beneficial microorganisms in inoculant compositions. See, e.g., U.S. Pat. No. 8,011,132 (describing a method of adding trehalose, sucrose or glycerol to the substantially stationary phase of fermentation) and U.S. Pat. No. 9,090,884 (describing the microencapsulation of microorgnaisms in a water-soluble encapsulating material).

[0006] Nevertheless, there remains a need for improved compositions and methods for enhancing the stability and survival of microorganisms in inoculant compositions.

SUMMARY OF THE CLAIMED INVENTION

[0007] The present disclosure provides stable inoculant compositions and methods for enhancing the survival and/or stability of microbial spores in inoculant compositions.

[0008] A first aspect of the present disclosure is an aqueous inoculant composition comprising *Penicillium* spores, one or more dispersants, one or more protectants, one or more aqueous additives and a non-aqueous liquid carrier. In some embodiments, the inoculant composition comprises one or more pesticides, one or more lipo-chitooligosaccharides, one or more chitooligosaccharides, one or more chitinous compounds, one or more flavonoids and/or one or more drying agents.

[0009] A second aspect of the present disclosure is a coated plant propagation material comprising a plant propagation material and a coating that covers at least a portion of an outer surface of the plant propagation material, said coating comprising an aqueous inoculant composition of the present disclosure.

[0010] A third aspect of the present disclosure is a kit comprising a coated plant propagation material of the present disclosure and a container housing the coated plant propagation material.

[0011] A fourth aspect of the present disclosure is a plant germinated from a coated plant propagation material of the present disclosure.

[0012] A fifth aspect of the present disclosure is a plant part harvested from a plant that was germinated from a coated plant propagation material of the present disclosure.

[0013] A sixth aspect of the present disclosure is a processed product derived from a plant that was germinated from a coated plant propagation material of the present disclosure.

[0014] A seventh aspect of the present disclosure is a crop comprising a plurality of plants germinated from coated plant propagation materials of the present disclosure.

[0015] An eighth aspect of the present disclosure is a method that comprises applying an aqueous inoculant composition of the present disclosure to a plant propagation material.

[0016] A ninth aspect of the present disclosure is a method that comprises, consists essentially of or consisting of planting a coated plant propagation material of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] FIG. **1** is a graph showing the survivability of *Penicillium bilaiae* spores on corn seeds stored at 10° C. and 50% relative humidity.

[0018] FIG. **2**. is a is a graph showing the survivability of *Penicillium bilaiae* spores on corn seeds stored at 10° C. or 20° C. and 50% relative humidity.

DETAILED DESCRIPTION

[0019] The present disclosure is explained in greater detail below. This description is not intended to be a detailed catalog of all the different ways in which the invention may be implemented or of all the features that may be added to the instant invention. For example, features illustrated with respect to one embodiment may be incorporated into other embodiments and features illustrated with respect to a particular embodiment may be deleted from that embodiment. In addition, numerous variations and additions to the various embodiments suggested herein, which do not depart from the instant invention, will be apparent to those skilled in the art in light of the instant disclosure. Hence, the following specification is intended to illustrate some particular embodiments of the invention and not to exhaustively specify all permutations, combinations and variations thereof.

[0020] The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the invention.